

A methodology for evaluating and compensating forest-related ecosystem services

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This system attempts to establish the relative value between different forest practices and forest conditions, using simple, industry standard measurements. It does not attempt to set prices or determine minimum eligibility requirements for incentive payment programs.

With this methodology, the buyer (incentives funder) has a reliable indicator of project quality, while the seller (service provider) has a quantifiable path to enhanced (and better compensated) forest management practices.

Note that the number values used below are highly speculative and may be inappropriate upon closer inspection; they should be viewed as examples to be refined later.

Basic unit of measurement – one Board Foot (Scribner scale)

The information derived from a standard timber cruise and survey plots can be used to quantify and qualify forest practices that exceed “business as usual”, for consideration by incentive programs. The board foot unit (representing sequestered carbon) can be used as an index upon which different incentive price levels can be affixed – it need not carry any pre-assigned value itself

Board footage is a basic indicator of stand maturity and quality.

Immature forests contain little to no board footage according to the Scribner scale. Stands containing less than roughly 20 mbf (thousand board feet) per acre (western WA State) are either barely at marketable maturity, poorly stocked or partially harvested. Above 20 mbf per acre, we can assume the stand exceeds the point at which it would normally be harvested, and thus a prime candidate for ecosystem services compensation.

Board footage directly translates to market value of retained trees.

The “stumpage” price is almost universally used by the timber industry to value standing timber. Although this price fluctuates constantly for each species, it is a published standard that provides a common point of reference. It is the best indicator of the value of retained trees, representing the opportunity cost of not harvesting them. Although the various incentive programs may pay for only a portion of the stumpage value, it is important to account for the full market value retained by the landowner, in the same way that the State must reduce its income projections when excluding timber from harvesting on its own lands.

Costs of establishing and monitoring forest stand volume are the responsibility of the landowner.

An accurate appraisal of standing timber volume is essential for proper forest and business management, and should be part of the normal cost of doing business for the landowner. Follow-up timber cruises to monitor compliance and quantify additionality should also be assumed by the landowner. Third party verification can be conducted via aerial photo or land-based assessment, as defined in the contract between the landowner and the ecosystem services incentive provider.

Metrics that can be derived from a conventional or enhanced timber cruise:

- 1) Total board feet of live, standing trees indicates overall market value**
- 2) Average board feet per acre indicates stand density and maturity**
- 3) Analysis of board feet by species indicates stand bio-diversity**
- 4) Analysis of DBH (tree diameter) indicates stand structural diversity**
- 5) Snags and LWD (large woody debris) can be assessed accordingly**
- 6) High number of trees with low DBH can indicate over-stocked stands**

Assign premiums and discounts for variances from multiple baselines:

Each premium or discount increases or decreases the base unit rate by a certain percentage, (i.e. 10 to 20%).

As a rule of thumb, the highest value parcels, earning every premium, could receive up to twice the base unit rate. On the other hand, eligible but otherwise poor quality parcels may end up with a unit rate approaching zero.

Premiums or discounts based on metrics listed above:

- 1) Total board feet x unit rate = total incentive payment**

Example: 2,000 mbf (100 acres @ 20mbf/acre) x .025 base unit rate (with no premiums or discounts) = \$50,000

- 2) Average board feet per acre: 20 mbf baseline, variance assessed at 0.5**

Examples: 40 mbf = 100% increase x 0.5 = 50% premium

10 mbf = 50% decrease x 0.5 = 25% discount

- 3) Relative percentage of board feet by species (bio-diversity):**

Sample baseline species distribution for western WA (Douglas fir-centric):

70% Douglas Fir

20% Other conifers

10% Alder and other hardwoods

Examples: 80 – 100% Douglas Fir = 10-20% discount

25 - 35% Other Conifers = 5-10% premium

15 - 25% Alder and other hardwoods = 5-10% premium

4) Relative percentage of tree size by diameter class (structural diversity):

Sample baseline tree size distribution:

70% less than 12" dbh

20% 12 – 18" dbh

10% more than 18" dbh

Examples: 80 – 100% less than 12" dbh = 20-40% discount

25 - 35% 12 – 18" dbh = 5-10% premium

15 - 25% more than 18" dbh = 10-20% premium

Tree diameter in conjunction with tree age provides a deeper understanding of structural diversity:

From the point of view of carbon, a 40 year-old tree with a 24" DBH is more valuable than a 60 year-old tree with a 15" DBH, not only because it contains far more carbon, but because it is a relatively young, rapidly growing tree sequestering carbon at an exceptional rate. Opportunities for additional premiums and discounts can be determined by accounting for the age of the trees.

5) Snags and large woody debris:

Baseline would include values for both quantity (bf/acre: higher = premium) and quality (level of decomposition (lower = premium) and average diameter (higher = premium)).

6) High trees per acre (TPA) with low average DBH: Overstocked stands

Certain combinations of high TPA with low DBH indicate overstocked, immature stands, and in some cases stagnated stands that will not likely progress towards a healthy, mature state. In these cases, a significant discount should be applied to encourage the landowner to take corrective action. Suppressed, overstocked stands would not rate highly enough to receive incentives unless they are contractually obligated to be adequately treated.

Other premiums or discounts

1) Length of Contract; Unit rate x 1% per year (100 year maximum)

Example: 100 year contract = 100% unit rate (full relative value)

40 year contract = 40% unit rate

2) Premium for legally defined Inter-Generational Transfer

Example: Ownerships defined as family corporations, trusts, or lands containing conservation easements represent an effort (and cost) towards ensuring long-term land stewardship that should be rewarded.

3) Premium for certification or approved management plan

Incentive Payment Options

Incentive Providers can compensate or support Landowners in one of four ways, in increasing levels of involvement: Purchase, Loan, Investment or Ownership

1) Purchase (Payment for Services)

Landowner “sells” the carbon in trees as an intangible “product”
Landowner receives taxable income and must pay appropriate tax
Long-term encumbrance of forestland is required
Public purchaser must collect and expense donations, grants, fees and/or taxes
Private purchaser must pass expense on their customers (Cap and Trade)

This option works best for landowners who are not primarily interested in the business of forest management, but would like some compensation to maintain a quality landscape in perpetuity for its own sake.

2) Loan

Landowner encumbers the carbon in trees as a collateralized asset
Loan proceeds are not taxable, but the landowner must pay low (3%?) interest
Encumbrance of forestland lasts as long as the loan is outstanding (indefinite)
Public or private lender holds a lien on an asset that generates interest income

This option works best for existing landowners who are actively involved in the business of forest management, and could use some low interest financing in return for deferring income from trees held in longer rotation.

3) Investment

Landowner co-owns the carbon in trees with an investment partner
Landowner and investor share profits and losses per their contract
Forest practices and carbon stocks are maintained per contract
Public or private investor owns a stake in a forest-based business

This option works best for new landowners who are interested in the business of forest management, but need investment partners to help with the additional financing required for maintaining mature timber stands.

4) Ownership

In this scenario, the incentives provider IS the landowner, either by previous acquisition (Federal, State, Municipal lands) or by purchasing new forest land.

This option works best for organizations (like The Nature Conservancy, EcoTrust) who desire the full control and benefit of ownership to exemplify their commitment to enhanced forest management and carbon sequestration.

On a side note, the tens of millions of acres of existing public forest land could greatly benefit from the same active management and forest enhancement that we are trying to incentivize on private lands, at a fraction of the cost. These vast lands represent the lowest hanging fruit and the best potential bang for the buck in carbon sequestration and ecosystem services.

Incentives Pricing

Price must ultimately be negotiated between the incentive provider and the landowner, but here are a few examples to put the pricing question in a larger perspective than just the purchase of ecosystem services:

Assuming that it costs roughly \$5,000 per acre to grow or purchase forests with marketable timber (at 20 mbf/acre), that cost would be fully recoverable by harvesting all the timber at \$0.25 per board foot.

To maintain carbon stocks in live, mature trees, the landowner must “hold” this investment without recovering the associated cost of creating that investment. Only rich folks can afford to do that for any length of time on large acreages. Ecosystem service payments can provide some compensation, but current incentive payment levels are nowhere near the full investment value.

Forest services versus forest products compensation, expressed in \$ per board foot (Orders of Magnitude):

< \$0.0025/bf (less than quarter of a cent): Carbon sequestration payment based on current price at Chicago Climate Exchange

\$0.025/bf (two and a half cents): Carbon sequestration payment based on voluntary market at \$5.00 per metric ton, with a 100-year encumbrance

\$0.25/bf: Timber sold as logs at recent stumpage prices

\$2.50/bf: Quality finished value-added lumber (retail price).

Using the four payment options for the forest profile defined above, we can envision different pricing levels for incentive payments or other financial support:

1) Purchase (Payment for Services)

A typical carbon sale with a price of \$5.00 per metric ton roughly translates to \$500 per acre, or 10% of the investment value

2) Loan

A loan could go for a higher rate, for example \$1,000 per acre, or 20% of the investment value, because the lender has tangible collateral in the trees plus some interest income.

3) Investment

Investors may put in up to 50% of the value, or \$2,500 per acre, representing partial ownership and control of the investment.

4) Ownership

By definition, owners pay 100%, or \$5,000 and up per acre, to achieve full control and benefit of enhanced forest management.

Public or private incentive providers may set minimum levels for eligibility or contract duration, require prescriptive management practices, regulatory exclusions and other conditions under which landowners may or may not receive incentive payments.

Although the methodology described above assumes no specific conditions for participation, it does allow incentive providers to define their own.

For example, one provider, desiring only the cream of the crop and offering a high price, may exclude landowners whose board foot unit rate is less than 1, indicating a forest condition that has been discounted below the overall baseline.

Another provider may prefer instead to pay a very low price for large acreages of “discounted” forest land, with a goal of maintaining the largest quantity of land as working forest for the lowest cost, and with less of a concern for exceptional forest quality.

But in every scenario, someone has to come up with the funding to maintain mature forests beyond the age at which they would normally be harvested. By default, existing landowners bear the entire cost. Incentive providers have many opportunities to financially participate in this long-term process, and we should not limit the scope and nature of this involvement to the conventional payment for ecosystem services, a market that is not currently well established or funded.